



"HORTICULTURE DEVELOPMENT IN INDIA": FORWARD WAY AHEAD

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ABSTRACT

The horticulture sector encompasses a wide range of crops e.g., fruit crops, vegetables crops, potato and tuber crops, ornamental crops, medicinal and aromatic crops, spices and plantation crops. While the first few Five-Year Plans assigned priority to achieving self sufficiency in food grain production, over the years, horticulture has emerged as an indispensable part of agriculture, offering a wide range of choices to the farmers for crop diversification. It also provides ample opportunities for sustaining large number of agro industries which generate substantial employment opportunities.

KEYWORDS: Horticulture, Sustainable development, cropping patterned & Diversification.

INTRODUCTION:

Horticulture sector is an integral element for food and nutritional security in the country. Horticulture is the main segment, while its various sub-segments are fruits, vegetables, aromatic and herbal plants, flowers, spices and plantation crops. All these are regarded as the essential ingredients of economic security. The wide range of agro-climatic conditions of India is conducive for growing a large variety of horticultural crops, including, root and tuber crops, mushroom, ornamental crops, plantation crops like coconut, areca nut, cashew and cocoa. The Government of India has recognized horticulture crops as a means of diversification in agriculture in an eco-friendly manner through efficient use of land and optimum utilization of natural resources. Horticulture seeks to create ample opportunities for employment, particularly for unemployed youths and women folk. India has maintained leadership in the production of many commodities like mango, banana, acid lime, coconut, areca nut, cashew, ginger, turmeric and black pepper. Presently, it is the second largest producer of fruits and vegetables in the world. India is next only to China in area and production of vegetables and occupies prime position in the production of cauliflower, second in onions and third in cabbage in the world. India has also made noticeable advancement in the production of flowers. Further, it is the largest producer, consumer and exporter of spices. India is home to a wide variety of spices like black pepper, cardamom (small and large), ginger, garlic, turmeric, chili and a large variety of tree and seed spices. Almost all the States in the country grow one or more spices.

India has made a good place for itself on the Horticulture Map of the World with a total annual production of horticultural crops touching over 1490 million tons during 1999-00. The horticultural crops cover about 9 per cent of the total area contributing about 24.5 per cent of the gross agricultural output in the country. However, the productivity of fruits and vegetables grown in the country is low as compared to developed countries. The information with regard to cropping pattern in horticultural crops particularly vegetables and tuber crops are not compiled and readily available.

Background to Horticultural Development in India: Horticultural development had not been a priority in India until recent years. In the period 1948-80, the main focus of the country was on cereals. Much planned efforts had not been made for horticultural development, except for some technical support and development efforts for specific commodities like spices, coconut and potato. During 1980-92 there was consolidation of institutional support and a planned process for the development of horticulture. It was in the post-1993 period that a focused attention was given to horticulture development through an enhancement of plan allocation and knowledge-based technology. Despite of this decade being called a "golden revolution" in horticultural production, the productivity of horticultural crops has increased only marginally from 7.5 tons per hectare in 1991-92 to 8.4 tons per hectare in 2004-05 (NHB, 2005). Then the National Horticulture Mission was launched in 2005-06 by the Government of India with a mandate to promote integrated development in horticulture, to help in coordinating, stimulating and sustaining the production and processing of fruits and vegetables and to establish a sound infrastructure in the field of production, processing and marketing with a focus on post-harvest management to reduce losses. In 2005 the total area under fruits and vegetables was 11.72 million hectares and the aggregate production stood at 150.73 million tons (NHB, 2005). As a result of this huge spurt in horticulture produce, India has become the second largest producer of fruits and vegetables in the world, next only to China. The annual area and production growth under fruits and vegetables in the period 1991-2005 in India was 2.6 per cent and 3.6 per cent respectively. This growth is quite significant compared to

the decline in area under cereals and cereal production which is growing at the rate of 1.4 per cent per annum only in the last one-and-a-half decades. The share of fruits and vegetables in the total value of agricultural exports has increased over the years from 9.5 per cent in 1980-81 to 16.5 per cent in 2002-03. But India is still lagging behind in actual exports of these produce. For example, India produces 65 per cent and 11 per cent of world's mango and banana, respectively, ranking first in the production of both the crops. Yet India's exports of the two crops are nearly negligible of the total agricultural exports from India.

The Indian horticulture sector is facing severe constraints such as low crop productivity, limited irrigation facilities and underdeveloped infrastructure support like cold storages, markets, roads, transportation facilities, etc. There are heavy post-harvest and handling losses, resulting in low productivity per unit area and high cost of production. However, on the other hand, India's long growing-season, diverse soil and climatic conditions comprising several agro-ecological regions provide ample opportunity to grow a variety of horticulture crops. Thus, efforts are needed in the direction to capitalize on our strengths and remove constraints to meet the goal of moving towards a formidable horticultural growth in India. The foreign trade policy in 2004-11 emphasized the need to boost agricultural exports, growth and promotion of exports of horticultural products.

Current Scenario:

Horticulture, over the past few years, has made remarkable progress in terms of expansion in area under different crops, increase in productivity, crop diversification, technological interventions for production and post harvest and forward linkages through value addition and marketing. A significant increase in area has been achieved in vegetables and flowers. Unprecedented growth has been achieved in off-season vegetable production and floriculture, making these sectors evolves as upcoming opportunities. Concept of greenhouse has become extremely popular. There has been a tremendous success in large scale of tomato in open field as well as under protected condition. Critical areas like pest and disease management have been given principal focus with intensification of efforts on containing decline problems especially in orange and large cardamom. Massive rejuvenation programmed in orange and re-plantation in large cardamom has brought back some ray of hope in the direction of revival of these crops. A number of nurseries have been established for producing healthy and quality planting materials of orange and large cardamom. The tissue culture laboratories, in private sector, have been able to supplement the requirement of quality planting materials. Infrastructure development to augment marketing and post harvest management are being accorded top priority. One number Integrated Pack House has been set up at Ramapo with facilities for grading, packaging and treatment of flowers. Another such facility is coming up at Mali to cater to the needs of South & West districts. Cold Rooms have been set up in various production clusters to aid production and marketing. One Integrated Processing Unit for ginger has been established at Birding, West district under Rashtriya Krishi Vikash Yojna (RKVY) to counter the uncertainties of market fluctuations. The Model Floriculture Centre at Namli has been strengthened with facilities for production of gerbera, rose and ileum. Another Model Floriculture Centre has been set up at Mani ram, South district. The Cymbidium Development Centre has been operationalised and is fully equipped with a tissue culture laboratory and training hall for production of large quantities of planting materials and imparting trainings. Technology Mission for Integrated Development of Horticulture, sponsored by the Government of India has played the most vital role in integrating all ongoing initiatives. In addition to this flagship programmed, other initiatives under RKVY, TSP/SCSP, BADP and State Plan/Non-Plan have made noteworthy contribution in supplementing the programmers spearheaded through

Technology Mission. The main success factors for successful programmed implementation are use of high quality planting materials, adoption of clusters and constant monitoring.

After the Green Revolution in mid-sixties, it became clear that horticulture, for which the Indian topography and agro climate are well suited, is the best option. India has emerged as the largest producer of mango, banana and cashew and second largest producer of fruits & vegetables in the world. The most significant development that happened in the last decade is that horticulture has moved from rural confines to commercial production and this changing scenario has encouraged private sector investment in production system management. The last decade has seen technological infusion like micro-irrigation, precision farming, greenhouse cultivation, and improved post harvest management impacting the development, but during the process various issues have emerged.

India has a wide variety of climate and soils on which a large number of horticulture crops such as fruits, Vegetables, potato, tropical tuber crops, mushrooms, ornamentals, medicinal and aromatic plants, plantation crops, spices, cashew, cocoa and betel vine are grown. After attaining independence in 1947, major emphasis by the Government of India was laid on achieving self-sufficiency in food production especially in cereals. After the Green Revolution in the sixties, it however, became clear that horticulture, for which the Indian topography and agro-climate are well suited, was an ideal method of achieving sustainability of small holdings. However, the need for diversification was acknowledged by Government of India only in mid-eighties to make agriculture more profitable, through efficient land use; create skilful employment for rural masses and women and optimize the utilization of natural resources (soil, water and environment). Past efforts have been rewarding in terms of increased production and productivity of horticulture crops. India has emerged as the largest producer of coconut, areca nut, cashew, tea and the second largest producer of fruits and vegetables in the world. The changing scenario encourages private investment. As a result horticulture has moved from rural confines to commercial ventures attracting youth since it has proved to be intellectually satisfying and economically rewarding. At national level horticulture sector has emerged as a potential player in the Indian economy contributing 30% to GDP in agriculture from more than 13.08% area under horticultural crops as well as a means of diversification in

overall development of agriculture. Horticulture invariably improves the economic status of our farmers. The earlier seasonal availability of fruits and vegetables has now extended to all the year round, increasing the per capital consumption of fruits and vegetables. It has also played a significant role in women empowerment, providing employment opportunities through mushroom cultivation, floriculture, processing, nursery raising, vegetable seed production etc. The national goal of achieving 4% growth in agriculture can be achieved through the major contribution in growth from horticulture.

Constraints in horticulture production: In spite of the fact that India is blessed with a wide range of soil and climatic conditions for growing large number of horticultural crops, a reasonable budgetary allocation, a sound network of R & D system, a large number of high yielding varieties / hybrids and proven technologies, there are still several constraints which adversely affect development of a sound horticulture industry. Major common constraints are given below in respect of various sectors of horticulture.

1. Lack of planning in Production
2. Non-availability of seeds of improved varieties.
3. High cost of basic production elements
4. Inadequate plant protection measures and non-availability of resistant varieties.
5. Weak marketing facilities
6. Transportation limits
7. Post harvest losses
8. A biotic stresses.

Cropping Pattern Change in India:

Agricultural diversification is an important instrument for economic growth. Diversification largely depends upon the opportunities and responsiveness of farmers to technological breakthrough, consumer demand, government policy, trade arrangements and development of irrigation, roads and other infrastructure (Kumar and Mittal, 2003). Changes in cropping patterns are responsive to these factors. The aggregate cropping patterns of the country are represented by the gross cropped area allocation among different crops and commodity groups. India has experienced a considerable degree of crop diversification in term of changes in the area under various crops since the Green Revolution which was largely in favor of food grains to meet the objective of self-sufficiency and country's food security. In past one decade, the changes in production pattern are more towards the horticulture sector and commercial crops like cotton. Table 1

Table 1: horticulture area & production pattern in India, 2001-2011
(Unit: 000' hectares, production: 000' MT)

| Commodity | 2001-02 | | 2004-05 | | 2006-07 | | 2008-09 | | 2009-10 | | 2010-11 | |
|--------------------------|---------|------------|---------|------------|---------|------------|---------|------------|---------|------------|---------|------------|
| | Area | Production | Area | Production | Area | Production | Area | Production | Area | Production | Area | production |
| Fruits | 4010 | 43001 | 5049 | 50867 | 5554 | 59563 | 6101 | 68466 | 6329 | 71516 | 6383 | 74878 |
| Vegetables | 6156 | 88622 | 6744 | 101246 | 7581 | 114993 | 7981 | 129077 | 7985 | 133738 | 8495 | 146554 |
| Flowers | 106 | 535 | 118 | 659 | 144 | 880 | 167 | 987 | 183 | 1021 | 191 | 1031 |
| Nuts | 117 | 114 | 106 | 121 | 132 | 150 | 136 | 173 | 142 | 193 | - | - |
| Plantation crops | 2984 | 9687 | 3147 | 9835 | 3207 | 12007 | 3217 | 11336 | 3265 | 11928 | 3306 | 12007 |
| Spices | 3220 | 3765 | 3150 | 4001 | 2448 | 3953 | 2629 | 4145 | 2464 | 4016 | 2440 | 5350 |
| Aromatic & medical crops | - | - | 131 | 159 | 324 | 178 | 430 | 430 | 509 | 573 | 510 | 605 |
| Mushroom | - | 40 | - | 40 | - | 37 | - | 37 | - | 41 | - | 41 |
| Honey | - | 10 | - | 10 | - | 51 | - | 65 | - | 65 | - | 65 |

Table 2: Area, production and productivity of horticulture crops in all India.
(Area: Million Ha. Production: MT, Productivity: Mt/Ha)

| Year | Area | Production | Productivity |
|---------|------|------------|--------------|
| 2001-02 | 16.6 | 145.8 | 8.8 |
| 2004-05 | 21.1 | 170.8 | 8.1 |
| 2006-07 | 19.4 | 191.8 | 9.9 |
| 2008-09 | 20.7 | 214.7 | 10.4 |
| 2009-10 | 20.9 | 223.1 | 10.7 |
| 2010-11 | 21.8 | 240.5 | 11.0 |

Source: www.nhb.com/database2011

All India level horticulture production and productivity is holistic growth. Horticulture production growth trend are given above table:

Fruits: A large variety of fruits are grown in India. Of these mango, banana, citrus, pineapple, papaya, guava, sapota, jackfruit, litchi and grape, among the tropical and sub-tropical fruits; apple, pear, peach, plum, apricot, almond and walnut among the temperate fruits and anole, beer, pomegranate, annona, fig, phalsa among the arid zone fruits are important. A comparison of area, production and productivity of different fruits during 2001-02 and 2010-11 is given in Table 1.

Vegetables: More than 40 kinds of vegetables belonging to different groups, namely, Solanaceous, cucurbitaceous, leguminous, cruciferous (Cole crops), root crops and leafy Vegetables are grown in India in tropical, sub-tropical and temperate regions. Important Vegetable crops grown in the country are tomato, onion, brinjal, cabbage, cauliflower, Okra and peas. India is next only to China in area and production of vegetables. India contributes to the world vegetable production and occupies first position in the production of cauliflower, second in onion and third in cabbage in the world. The estimated crops wise area and production of major vegetables during 2001-02 and 2010-11 is given in Table 1. The present area is estimated at 8.495 million ha with production of 146.554 million

metric tons and average productivity of 17.25 tons per ha.

Floriculture: Though flower cultivation has been practiced in India since times immemorial, floriculture has blossomed into a viable business only in recent years. Considering the potential this sector has in generating income and employment opportunities, promoting greater involvement of women and enhancement of exports, it has been identified as an Extreme Focus Area for exports by the Govt. of India. India is known for growing traditional flowers such as jasmine, marigold, chrysanthemum, tuberose, crossandra and aster. Commercial cultivation of cut flowers such as rose, orchids, gladiolus, carnation, anthurium, gerbera and lilies has also become popular. The important flower growing states are Tamil Nadu, Karnataka, Andhra Pradesh in the south; Maharashtra in west, West Bengal and North Sikkim in the east and Himachal Pradesh, Jammu & Kashmir in the north. The area under flower cultivation during 2010-11 was estimated at 0.19 million ha with a production of 1.031 metric tons of loose flowers with stem. Although quantitative data on trade value of flowers in the country is not available, yet the availability of flowers in all the cities and growing number of florists are indicative of very high rate of growth.

Medicinal and Aromatic Plants: India has been considered as a treasure house of valuable medicinal and aromatic plant species. The Ministry of Environment and Forests, Govt. of India have identified and documented over 9,500 plant species considering their importance in the pharmaceutical industry. In the present context of 'back to nature' in health care, it is relevant that these valuable plant species are not only conserved but also promoted for commercial cultivation in order to meet the increasing demand within the domestic and export markets. Shift from collection to cultivation of medicinal and aromatic plants will also ensure purity, authenticity and sustainable supply of raw materials required for herbal drugs, including polyherbal. Agro-techniques have been developed for a large number of medicinal and aromatic plants by the ICAR Institute and several State Agricultural Universities under the of All India co-ordinate project on Medicinal and Aromatic Plants. However, due to unorganized marketing arrangements this sector has not exploited its full potential.

Spices: Spices constitute an important group of horticultural crops and are defined as vegetable products or mixture thereof, free from extraneous matter, used for flavoring, seasoning and imparting aroma in foods. The term applies equally to the product in the whole form or in the ground form. India is known as the home of spices and produces a wide variety of spices like black pepper, cardamom (small and large) ginger, garlic, turmeric, chili and a large variety of tree and seed spices. Almost all the states grow one or more spices. The major spice producing states are Andhra Pradesh, Kerala, Gujarat, Rajasthan, Maharashtra, West Bengal, Karnataka, Tamil Nadu, Orissa and Madhya Pradesh. N.E. region and Andaman & Nicobar Islands have also been identified as potential areas for spice cultivation. While black pepper and small cardamom are mainly confined to south India, ginger and turmeric are grown in S.E, N.E. region and in many other states. Large cardamom is mainly confined to Sikkim. Cumin, coriander and fenugreek are mainly confined to northern states.

EXPORT OF HORTICULTURAL COMMODITIES:

Among horticultural commodities, India is exporting fresh fruits, vegetables, processed products of fruits and vegetables, cut & dried flowers, medicinal and aromatic plants, seeds, spices, cashew kernels and their products, tea and coffee. The total value of export of these commodities increased total value of exports of agricultural commodities from India. Of these, export of tea leads all horticultural commodities followed by spices, coffee, cashew and processed fruits and vegetables. The status of export of individual commodities / groups of commodities is given in this table.

Export of horticulture crops in India (QTY: MTs, Value: lacs)

| Year | QTY | Value |
|---------|------------|-----------|
| 2006-09 | 3393602.88 | 676915.44 |
| 2009-10 | 3304014.67 | 766962.33 |
| 2010-11 | 2733144.75 | 696461.01 |

Source: apeda website

EA, PRODUCTION AND PRODUCTIVITY OF COMMON PROBLEMS:

(i) Inadequate availability of disease free, high quality planting material. (ii) Micro-propagation techniques are under exploited. (iii) Slow dissemination and adaptability of improve high cultivars/hybrids. (iv) Inadequate facility for identification of nutrient deficiency and disorders (v) Lack of diseases and pests' outbreak forecast service. (vi) Unavailability of refined intensive integrated production systems (vii) Lack of quality standards. (viii) Lack of technologies in value addition. (ix) Lack of post harvest management technology and infrastructure (x) Weak database and poor market intelligence. (xi) Poor marketing practices and infrastructure (xii) Instability of prices, with no support price mechanism. (xiii) Inadequate technical manpower/human resource in farming system. (xiv) Poor credit supply, high rate of interest coupled with inadequate crop insurance scheme. (xv) Late implementation of government policies and schemes. (xvi) Absence of horticultural crop suitability map of India based on agro climatic con-

ditions depicting most suitable areas for optimum productivity of a particular crop. While several above listed problems are common to all horticultural crops, there are also crop specific problems causing constraints. The problems are listed below.

CROPS SPECIFIC PROBLEMS:

Fruit crops: (i) Long gestation period. (ii) Predominance of senile orchards (e.g. apple and mango) (iii) Lack of technology to manage problems like spongy tissue, alternate bearing and malformation in mango, wilt in guava, decline in citrus, etc. (iv) Location specific technologies are not available.

Vegetable crops: (i) High cost of production due to labor intensive technologies. (ii) Exorbitant charges of hybrid seeds. (iii) Risk intensive production system. (iv) Lack of low cost environmental controlled green houses for high quality production. (v) Supply and demand profile frequently changing with season, year and kind of vegetable.

Potato: (i) Lack of varieties for diverse processing problems. (ii) Low seed multiplication rate (5-10 times) from breeders' seed to certified seed. (iii) Rapid deterioration of varieties due to viral complexes. (iv) Lack of awareness of TPS technology. (v) Lack of required cold storage space and non availability of low cost short term storage structure.

Mushroom: (i) Available technology not cost effective. (ii) Lack of design of low cost mushroom houses. (iii) Inadequate availability of quality spawns of different strains.

Tuber crops: (i) Slow multiplication rate. (ii) Poor management practices for pests like sweet potato weevil and diseases like cassava mosaic.

Floriculture: (i) Lack of indigenous production techniques. (ii) F1 hybrids not fully exploited. (iii) Narrow product range. (iv) High rate of tariff imposed by importing countries.

Medicinal and Aromatic Plants: (i) Trade of medicinal and aromatic plants is very secretive due to absence of any regulatory mechanism. (ii) Very less number of plants under cultivation.

Spices: (i) Lack of variability for host resistance to biotic and abiotic stresses. (ii) Severe crop losses caused due to disease and pests. (iii) Vagaries of monsoon affect crop growth, productivity and sustainability.

Coconut: (i) Large area of old and senile plantations and most of these plantations under rain fed condition. (ii) Rain fed cropping nature. (iii) Prevalence of diseases and pests like root-wilt, ganoderma wilt, tatipaka diseases and eriophid and red palm weevil severe threats to industry. (iv) Farm level processing is inadequate.

Areca nut: (i) Incidence of diseases like yellow leaf diseases. (ii) Lack of irrigation facilities.

Oil palm: (i) Poor water management in the palm orchards.

Cocoa: (i) Large areas of old and senile plantations. (ii) Lack of high yielding clones. (iii) Black pod rot in cocoa continues to be problems in production front. (iv) Farm level processing is inadequate.

Cashew: (i) Increasing level of senility of the existing plantation. (ii) Poor management of pests like tea mosquito bug and stem borer. (iii) Farm level processing is inadequate.

Tea: (i) Old age of tea bushes. (ii) Slower pace of replantation - the rate of replanting is less than 0.4% as against the desired level of 2.0%. (iii) Poor drainage and lack of irrigation when needed greatly reduces the yield. (iv) Stagnation in productivity level compounded by high land labor ratio. (v) Higher rate of taxation in the income from tea. (vi) Stiff competition from the soft drinks.

Coffee: (i) Presence of large number of tiny growers with less than two hectares. (ii) Existence of old moribund plant material due to reluctance of replant with new varieties.

CONCLUSIONS & SUGGESTION:

Development of agriculture in India needs some critical management inputs particularly that of supply chain management -- collaboration among various stakeholders along with efficient vertical and horizontal integration. The horticulture sector in particular has to prioritize development of research in the issues of genetics, biotechnology, integrated and sustainable production systems, post-harvest handling, storage, marketing and consumer education. Diversification offers an attractive option and a major source of pushing up growth of agricultural sector. While technological up-gradation and associated institutional changes are identified as thrust areas for future development of the horticulture sector, exports are considered to be most important for the growth of the sector. India can look forward to emerge as a major producer of horticultural products and thus secure reasonable market access for its agro exports, which are largely

dependent on the competitive technologies that will help in enhancing export potential. This development will also help in overall growth of the economy through generation of extra foreign exchange, creating employment opportunities and also upliftment of the small and marginal farmers, with definite positive implications on income and employment. The government should create a positive environment that will ensure a mutually beneficial relationship between farmers and organized sector. Horticultural crop diversification should be encouraged by intercropping horticultural with non-horticultural crops. This will yield more food, more income and better soil health. To increase the production and productivity of fruits and vegetables, introduction of vegetables in the crop rotation and adoption of recommended practices is very important. The use of vegetables in intercropping also helps in increasing the incomes of farmers during the period when the fruit orchard has not become commercially viable. The diversification plan of the horticulture sector needs to identify potential crops area wise and the area under low yielding vegetables and fruits should be shifted to more productive and profitable one. There is a strong need to strengthen the research on horticultural crops to develop demand-driven technology by improved variety, pest management, etc., in both public. The horticultural development requires a minimum set of basic production factors, an optimal crop management infrastructure, post-harvest infrastructure, entrepreneurial management and horticultural expertise, logistical infrastructure and supporting financial infrastructure. Development of horticultural sector should be accompanied by the growth of the agro processing industry. The opportunity exists to promote the industry by intensifying production of a required, appropriate variety of tomatoes, cucumbers, mangoes, pineapples, lemons, etc., for the products like ketchup, sauce, juice and pickles. Thus the production strategy should target not only meeting the domestic and export demand of fresh products but also of the processed products. There is the need to improve postharvest operations related to handling, storage and marketing of fresh and processed produce. Volumes saved in post-harvest losses are actually the surpluses generated, without additional cost. The horticulture sector has an immense potential of generating employment. Additional employment can be generated by developing the horticulture based agro processing units. Empirical analytical evidence has shown that the horticultural export has increased the opportunity for higher earnings for smallholders and that the much higher land sizes owned by horticultural smallholders are indeed a cause or consequence for their participation in the sector. Notwithstanding the enormous contribution of horticultural exports to macroeconomic growth as an insulator from sharp and unexpected changes in the terms of trade of Ghana's traditional exports, the micro level distributional effects has not favored the chronically poor households who are structurally impeded from seizing the existing opportunities of the export boom by virtue of their poor resource. This sector needs to be developed as an organized industry and has to be run collectively by all the stakeholders with farmers as entrepreneurs and private sectors.

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